



ST⁴STEM

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Student and Teacher Technology Transformation Teams (ST4) is an NSF funded project for increasing the ability of secondary Science, Technology, Engineering and Mathematics (STEM) teachers and students to collaboratively learn and apply STEM skills using information and communications technology (ICT). This project will provide teachers and students the opportunity to work in teams and use web-accessible ICT tools to produce design-based learning labs (DBLLs) that consist of web-based multi-media enhanced presentations of technical solutions to current, real-world problems. Producing and evaluating DBLLs helps students understand the processes and interactions encountered in professional work and stimulate development of in-depth technical knowledge and skills. The proposed training will include teachers and students in the statewide programs of biotechnology, information technology, engineering and agriscience.

Grant Objectives

Goal 1: Improve learning effectiveness and collaborative skills of teachers and students in STEM programs via ICT training and design-based learning.

- Objective 1: Provide training to teachers and students that increase their skills for using ICT tools to communicate, collaborate, and design solutions to real-world problems across four STEM disciplines.
- Objective 2: Increase teachers' ability to implement active, collaborative learning in STEM courses.
- Objective 3: Provide ongoing, follow-up support to teachers at their schools to ensure implementation of ICT tools, curriculum, and team-based learning.
- Objective 4: Enable STEM students to improve presentation and communication skills by demonstrating their DBLLs to peers, professional, and their community.

Goal 2: Expand, disseminate, and sustain the ST4 Training Model, curriculum, and positive impacts in CTE programs in Arizona and nationwide.

Training Design

ICT training will have two focal points: (1) Teachers will focus on how to utilize ICT and Design-based Learning Labs (DBLL) methods to improve student learning. (2) Students will learn how to use ICT to gather and apply knowledge specific to their chosen STEM discipline and how to collaborate effectively with peers, teachers, and mentors on team projects. DBLLs will be the main output from learning teams and will consist of proposed solutions to problems or designs that address global or community-oriented needs.

ST4 learning teams will have different configurations. Learning teams composed of five teachers in the same discipline will begin ICT training together. These teams will work with STEM college faculty mentors to create a pool of design problems for each STEM discipline and which have high-interest potential to students. STEM teachers will select two "student leaders" each academic year to participate in the training with them. They will assemble into discipline-specific teams containing one or two teachers and up to four student leaders. Teamwork on DBLLs will occur in STEM classes, during webinar training, and during participant free time. After student learning teams have completed at least one DBLL and mastered the basic ICT toolset, they will form "transformational teams" and work on complex problems that require collaboration of two or more STEM disciplines.

Benefits for Teachers & Students:

- Stipends for teachers and student leaders
- Access to college faculty mentors
- Tuition for CTE 210 Teaching Methods and Curriculum Development and CTE 230 Instructional Technology courses
- Books on Information and Communication Technologies for the classroom
- Participation in a community of learning
- Access to a closed beta game-based learning management system
- On-going support